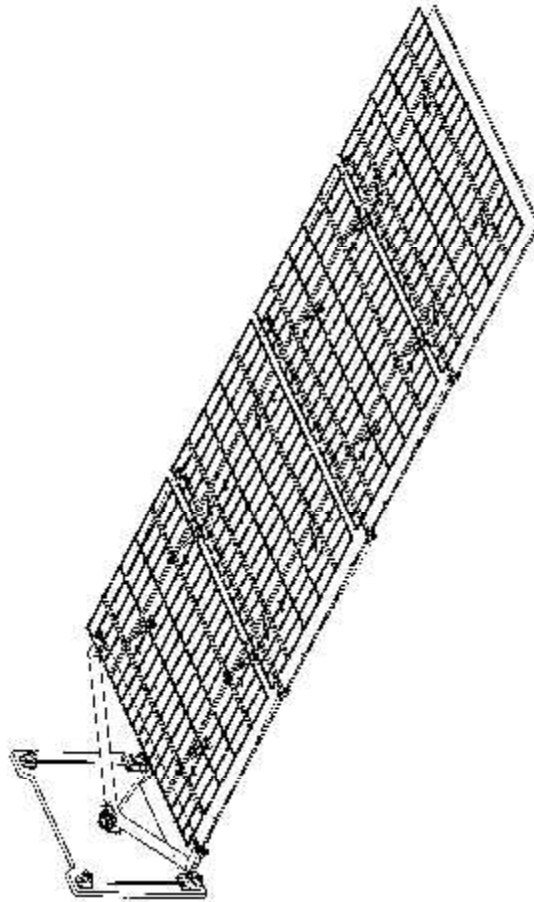


# **SCARLET Photovoltaic Concentrator Array Selected for Flight Under NASA's New Millennium Program**

The NASA Lewis Research Center continues to demonstrate its expertise in the development and implementation of advanced space power systems. For example, during the past year, the NASA New Millennium Program selected the Solar Concentrator Array with Refractive Linear Element Technology (SCARLET) photovoltaic array as the power system for its Deep Space-1 (DS-1) mission. This Jet Propulsion Laboratory (JPL) managed DS-1 mission, which represents the first operational flight of a photovoltaic concentrator array, will provide a baseline for the use of this technology in a variety of future government and commercial applications.

SCARLET is a joint NASA Lewis/Ballistic Missile Defense Organization program to develop advanced photovoltaic array technology that uses a unique refractive concentrator design to focus sunlight onto a line of photovoltaic cells located below the optical element. The general concept is based on previous work conducted at Lewis under a Small Business Innovation Research (SBIR) contract with AEC-Able Engineering, Inc., for the Multiple Experiments to Earth Orbit and Return (METEOR) spacecraft. The SCARLET II design selected by the New Millennium Program is a direct adaptation of the smaller SCARLET I array built for METEOR. Even though SCARLET I was lost during a launch failure in October 1995, the hardware (designed, built, and flight qualified within 6 months) provided invaluable information and experience that led to the selection of this technology as the primary power source for DS-1.

The SCARLET II design is a 2.6-kW array that uses advanced multijunction photovoltaic cells and a variety of other improvements in the lens design and array-deployment mechanisms. The array will be used primarily to power the 2.5-kW electric propulsion thruster that will propel the DS-1 spacecraft on this comet/asteroid rendezvous mission. In addition to the first space flight demonstration of photovoltaic concentrator technology, the SCARLET II program will also help quantify the advantages of this technology for future applications: high array efficiency at low cost, inherent resistance to radiation degradation, and minimal space plasma interaction.



*SCARLET II/New Millennium Deep Space-1 solar array.*

SCARLET II completed its critical design review in July 1996, and flight hardware fabrication is now underway. Delivery of the array is scheduled for August 1997, with a launch in July 1998. Whereas NASA Lewis managed the initial part of the SCARLET II program, flight hardware construction is now managed under a contract by the Ballistic Missile Defense Organization, the primary funding organization. NASA Lewis continues to play a vital role not only in continued support of the SCARLET II/DS-1 mission, but in developing performance improvements and evaluating additional mission applications for advanced photovoltaic concentrator technology.

**Lewis contact:** Michael F. Piszczor, Jr., (216) 433-2237,  
Michael.F.Piszczor@grc.nasa.gov

**Author:** Michael F. Piszczor, Jr.

**Headquarters Program Office:** OSS